In the Claims

Claims 1-17 and 27-37 are pending in the application with claims 30-37 added herein.

1. (previously presented) A capacitor fabrication method comprising:

forming undoped, rugged polysilicon over a substrate;

forming a first capacitor electrode comprising TiN over the rugged polysilicon, the first electrode having an innermost surface area per unit area and an outermost surface area per unit area that are both greater than an outer surface area per unit area of the substrate, the innermost surface of the first electrode comprising a surface of the first electrode that is firstly formed over the substrate, and the outermost surface of the first electrode comprising a surface of the first electrode that is lastly formed over the substrate;

forming a capacitor dielectric layer over the first electrode; and

forming a second capacitor electrode over the dielectric layer.

2. (previously presented) The method of claim 1 wherein the first electrode consists of TiN.

3. (previously presented) The method of claim 1 wherein the substrate comprises a bulk semiconductive wafer.

4. (previously presented) The method of claim 1 wherein the first electrode is on and in contact with the rugged polysilicon.

5. (previously presented) The method of claim 1 wherein the rugged polysilicon comprises hemispherical grain polysilicon.

6. (previously presented) The method of claim 1 wherein the forming the rugged polysilicon comprises using a seed density sufficiently small to yield at least some spaced apart grains.

7. (previously presented) The method of claim 1 wherein the outermost surface area of the first electrode is at least 30% greater than the outer surface area of the substrate.

8. (previously presented) The method of claim 1 wherein the forming the first electrode comprises:

chemisorbing a layer of a first precursor at least one monolayer thick over the substrate;

chemisorbing a layer of a second precursor at least one monolayer thick on the first precursor layer, a chemisorption product of the first and second precursor layers being comprised by the first capacitor electrode.

9. (original) The method of claim 1 wherein the dielectric layer comprises Ta_2O_5, ZrO_2, WO_3, Al_2O_3, HfO_2, barium strontium titanate, or strontium titanate.

10. (previously presented) A capacitor fabrication method comprising:

forming an opening in an insulative layer over a substrate, the opening having sides and a bottom;

forming a layer of polysilicon over the sides and bottom of the opening;

removing the polysilicon layer from over the bottom of the opening;

converting at least some of the polysilicon layer to undoped hemispherical grain polysilicon;

conformally forming a first capacitor electrode on and in contact with the hemispherical grain polysilicon, the first electrode being sufficiently thin that the first electrode has an outermost surface area per unit area greater than an outer surface area per unit area of the substrate underlying the first electrode and the outermost surface of the first electrode comprising a surface of the first electrode that is lastly formed;

forming a capacitor dielectric layer on the first electrode; and

forming a second capacitor electrode over the dielectric layer.

11. (previously presented) The method of claim 10 wherein the first electrode consists of TiN.

12. (original) The method of claim 10 wherein the converting the polysilicon comprises using a seed density sufficiently small to yield at least some spaced apart grains.

13. (previously presented) A capacitor fabrication method comprising:

forming an opening in an insulative layer over a substrate, the opening having sides and a bottom;

forming a layer of polysilicon over the sides and bottom of the opening;

removing the polysilicon layer from over the bottom of the opening;

converting at least some of the polysilicon layer to hemispherical grain polysilicon;

chemisorbing a layer of a first precursor at least one monolayer thick on the converted polysilicon;

chemisorbing a layer of a second precursor at least one monolayer thick on the first precursor layer, a chemisorption product of the first and second precursor layers being comprised by a first capacitor electrode on and in contact with the hemispherical grain polysilicon, the first electrode being sufficiently thin that the first electrode has an outermost surface area per unit area greater than an outer surface area per unit area of the substrate underlying the first electrode and the outermost surface of the first electrode comprising a surface of the first electrode that is lastly formed;

forming a capacitor dielectric layer on the first electrode; and

forming a second capacitor electrode over the dielectric layer.

14. (original) The method of claim 10 wherein the first electrode comprises TiN.

15. (original) The method of claim 10 wherein the dielectric layer comprises Ta_2O_5, ZrO_2, WO_3, Al_2O_3, HfO_2, barium strontium titanate, or strontium titanate.

Claims 16-26 (cancelled).

27. (previously presented) The method of claim 1 wherein the TiN forms a continuous layer within the first electrode.

28. (previously presented) A capacitor fabrication method comprising:

forming an opening in an insulative layer over a substrate, the opening having sides defined by an exposed surface of the insulative layer and having a bottom defined by an exposed surface of the substrate;

forming a layer of polysilicon over the sides and bottom of the opening;

removing the polysilicon layer from over the bottom of the opening;

converting at least some of the polysilicon layer to undoped hemispherical grain polysilicon;

conformally forming a continuous first capacitor electrode having an innermost surface on and in contact with the hemispherical grain polysilicon and having an opposing outermost surface that is a lastly formed surface of the first electrode, the first electrode being sufficiently thin that the first electrode has an outermost surface area per unit area greater than a combined surface area per unit area of the sides and bottom of the opening underlying the first electrode;

forming a capacitor dielectric layer over the first electrode; and

forming a second capacitor electrode over the dielectric layer.

29. (previously presented) A capacitor fabrication method comprising:

forming an opening in an insulative layer over a substrate, the opening having sides defined by an exposed surface of the insulative layer and having a bottom defined by an exposed surface of the substrate;

forming a layer of polysilicon over the sides and bottom of the opening;

removing the polysilicon layer from over the bottom of the opening;

converting at least some of the polysilicon layer to hemispherical grain polysilicon;

chemisorbing a layer of a first precursor at least one monolayer thick on the converted polysilicon;

chemisorbing a layer of a second precursor at least one monolayer thick on the first precursor layer, a chemisorption product of the first and second precursor layers being comprised by a continuous first capacitor electrode having an innermost surface on and in contact with the hemispherical grain polysilicon and having an opposing outermost surface that is a lastly formed surface of the first electrode, the first electrode being sufficiently thin that the first electrode has an outermost surface area per unit area greater than a combined surface area per unit area of the sides and bottom of the opening underlying the first electrode;

forming a capacitor dielectric layer over the first electrode; and

forming a second capacitor electrode over the dielectric layer.

30. (new) The method of claim 10 wherein the first capacitor electrode comprises TiN.

31. (new) The method of claim 10 wherein the first electrode has an innermost surface area per unit area greater than the outer surface area per unit area of the substrate.

32. (new) The method of claim 13 wherein the first capacitor electrode comprises TiN.

33. (new) The method of claim 13 wherein the first electrode has an innermost surface area per unit area greater than the outer surface area per unit area of the substrate.

34. (new) The method of claim 28 wherein the first capacitor electrode comprises TiN.

35. (new) The method of claim 28 wherein the first electrode has an innermost surface area per unit area greater than the combined surface area per unit area of the opening.

36. (new) The method of claim 29 wherein the first capacitor electrode comprises TiN.

37. (new) The method of claim 29 wherein the first electrode has an innermost surface area per unit area greater than the combined outer surface area per unit area of the opening.